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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,638	04/22/2004	Kevin J. Torek	MICRON.096C1	7034

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EXAMINER	
MACARTHUR, SYLVIA	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/829,638	TOREK ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-17 and 19-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-17 and 19-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination (RCE)

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/18006 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-8 and 10-38 considered but are moot in view of the new ground(s) of rejection.

Amended claims 1,10,17,23, and 31 recite a pulsating liquid source. The prior art of Kenny et al teaches a pulsating liquid source. The prior art of Bergman and Dautauras were withdrawn as the examiner agrees that they both fail to teach the claim limitations as presently amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-7, 9, 19, 25, 26, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenny et al (US 2004/0103919) in view of Erk et al (US 5,593,505).

Kenny et al teaches cleaning a wafer with ozone. Section [0041] teaches that a cassette is placed in the chamber 15. The workpieces are rotated via rotor assembly 30. Nozzles 40 are disposed within the chamber 15 to direct a spray mixture of ozone (creating an ozone environment) and a liquid onto the surfaces of the workpiece, see [0027]-[0029]. Kenny teaches a pulsating liquid source configured to variably (see reference to "on time"/greater flow and "off time"/no flow, see claim 47 of present invention) pulse the solution through the sprayer, see sections [0048- 0049]. A pump 55 is provided to provide the liquid under pressure along a fluid flow path 60. Section [0039] teaches that the boundary layer is controlled by the controlled spraying of the process liquid.

Regarding claims 1 and 7: Kenny et al fails to teach specifically that the pulsating liquid source has a duty cycle varying between 3% - 97%. The duty cycle of the pulsating fluid source is a matter of optimization. It would have been obvious for one of ordinary skill in the art at the time of the claimed invention to have determined the optimum value of the duty cycle of pump 55 in coordination with the periodic pulsing of nozzles 40 through routine experimentation without a showing of criticality, see In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Additionally, regarding claims 1 (see also claim 36): Kenny broadly teaches a rotator and thus fails to teach that the rotator (means for rotating) creates a gap between the wafers and the cassette.

Erk et al teaches a rotator wherein a gap is between the cassette and wafer due to the teaching by Erk et al that every portion of the wafer is subjected to cleaning, see col. 6 lines 10-41. This would deem obvious for a gap to exist between the wafer and the cassette to allow cleaning solution to pass through the gap. The motivation to modify the apparatus of Kenny et al

with the rotator of Erk et al is that the carrier provides ample support to the wafer while allowing rotation of the wafer.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Kenny et al to include the rotator of Erk et al.

Regarding claims 2 and 37: Kenny et al further fails to teach that the cassette is stationary. The teachings of Erk et al were discussed above. Furthermore Erk et al teaches that a cassette is stationary col.6 lines 50-55. The motivation to modify the apparatus of Kenny et al with the rotator of Erk et al is that the carrier provides ample support to the wafer while allowing the cassette to remain stationary despite the rotation of the wafer.

Regarding claims 3 and 19: Claim 6 of Erk et al teaches that the wafer is rotated at 8 rpm, which is less than 100 rpm. In col. 6 lines 25-35, Erk et al teaches that the velocity at which the wafers are rotated allows for rapid cleaning which makes the process efficient. The velocity of rotation is a result effective variable commonly determined by routine experimentation. Conducting routine experimentation would result in determining the optimal velocity to rotate the wafers to produce the best cleaning result obvious to one of ordinary skill in the art. Thus it would have been obvious for one of ordinary skill to rotate the wafers at an optimal velocity in order to produce the desired cleaning result.

Regarding claim 4: The solution of Kenny et al is ozone rich (due to the zone generator) and the solution combines with the ozone in the ozone rich environment. The solution is ozone rich in that an ozone generator 72 is provided to ensure that the solution is concentrated with ozone see [0034]. Ozone is injected into flowline 70, see [0032].

Regarding claim 5: Figs. 1, 2, 4, and 5 of Kenny et al illustrates a plurality of nozzles.

Regarding claim 6: Kenny et al teaches the frequency of pulsing in section [0048]. Kenny et al fails to teach specifically that the frequency of pulsing in the recited claims. The pulsing frequency of the fluid source is a matter of optimization affecting the overall treatment result. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to have determined the optimum frequency of pulsing the fluid through routine experimentation without a showing of criticality, see In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Regarding claim 9: Kenny et al illustrates in Fig.1 that the wafer (workpiece 20) is between the sprayer 40 and the rotator 30.

Regarding claims 25 and 26: Kenny et al broadly teaches a wafer rotator 30 with one axle 37 (axis of rotation). Kenny et al fails to that the axles contact the edge of the wafer (claim 25) or fails teach two axes (claim 26). The teachings of Erk et al were discussed above. Erk et al further teaches camming surfaces (axles 108) see col. 5 lines 45-63 and Fig. 1 contacting the wafer edge. The motivation to allow the axle to contact the edge of the wafer is to ensure rotation of the wafer which allowing for the maximum exposure of the wafer to the treatment fluid. The motivation to substitute the rotator of Kenny et al with the rotator of Erk et al is that the two axles allows for the simultaneous reciprocating and rotating of the wafers which increases the number of rotation cycles of the wafers according to col. 6 lines 10-41 of Erk et al. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to substitute the rotator of Kenny et al with the rotator of Erk et al.

5. Claim 10-12, 14,16, 17, 20-24, and 27-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenny et al (US 2004/0103919).

Regarding claims 10, 14, 17, 20-23, and 35: Kenny et al teaches cleaning (at least one) wafer with ozone. Section [0041] teaches that a cassette is placed in the chamber 15. The workpieces are rotated via rotor assembly 30 (rotating platform). Nozzles 40 are disposed within the chamber 15 to direct a spray mixture of ozone (creating an ozone rich environment) and a liquid onto the surfaces of the workpiece, see [0027]-[0029]. Kenny teaches a pulsating liquid source configured to variably supply in multiple pulses (see reference to "on time"/greater flow and "off time"/no flow, see claim 47 of present invention) the solution through the sprayer, see sections [0048- 0049]. A pump 55 is provided to provide the liquid under pressure along a fluid flow path 60.

Kenny et al fails to teach specifically that the pulsating liquid source has a duty cycle varying between 3% - 97%. The duty cycle of the pulsating fluid source is a matter of optimization. It would have been obvious for one of ordinary skill in the art at the time of the claimed invention to have determined the optimum value of the duty cycle of pump 55 in coordination with the periodic pulsing of nozzles 40 through routine experimentation without a showing of criticality, see In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Regarding claims 11 and 12: Kenny et al teaches at least one rod (support 25).

Regarding claims 16 and 28: Kenny et al teaches a process temperature of 90-100 degrees C, noting that preferred temperature centers around 95 degrees C, see [0046].

Regarding claims 24 and 32: Kenny et al teaches spin axis (axle) 37 in [0027].

Regarding claim 27: A plurality of nozzles is taught in [0029].

Regarding claims 29 and 34: Kenny et al illustrates in Fig.1 that the wafer (workpiece 20) is between the sprayer 40 and the rotator 30.

Regarding claim 31: Applicant has invoked 35 USC 112 by reciting a) a means for rotating multiple wafers within a semiconductor processing chamber and b) a means for pulsating an ozone rich liquid solution multiple times onto multiple wafers at a duty cycle that varies between 3% and 97%. The examiner interprets a means for rotating a means for rotating multiple wafers within a semiconductor processing chamber according to the disclosed specification and drawings as rotating axles 120 and the means for pulsating an ozone rich liquid solution as ozone shower system 15 and pump 40. Kenny et al teaches a rotor assembly 30 and a pulsating supply of ozone rich liquid source via nozzles 40 and pump 55. Kenny et al fails to teach specifically that the pulsating liquid source has a duty cycle varying between 3% - 97%. The duty cycle of the pulsating fluid source is a matter of optimization. It would have been obvious for one of ordinary skill in the art at the time of the claimed invention to have determined the optimum value of the duty cycle of pump 55 in coordination with the periodic pulsing of nozzles 40 through routine experimentation without a showing of criticality, see In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Regarding claim 33: Kenny et al teaches a pump 40.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kenny et al (US 2004/0103919) in view of Curtis et al (US 6,622,737).

The teachings of Kenny et al were discussed above.

Kenny et al fails to that the processing chamber rotates.

Curtis et al teaches an apparatus for rinsing and drying a wafer wherein the housing of the chamber is rotated in addition to the workpiece, see the abstract and col. 3 lines 30-48.

Curtis et al recites that the motivation for rotating the chamber is that the additional

centrifugal force generated during rotation enhances the distribution of process fluid across the wafer. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to rotate the chamber

7. Claims 15 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenny et al (US 2004/0103919) in view of Swain (US 5,211,753)

The teachings of Kenny et al were discussed above.

Kenny et al fails to vary the speed of rotation of the wafers.

Swain teaches a treatment apparatus wherein the wafer is rotated. In col. 12, Swain teaches that it is known to vary the speed of workpiece rotation using a controller. The motivation to modify the apparatus of Kenny et al to provide such a controller is to allow for varying of the rotation of the workpiece during the process, either between stages or while the process is occurring. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to vary the speed of the rotation of the wafers as taught by Swain.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

November 27, 2006